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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,908	02/12/2004	Philip Lee Langdale	AUS920030740US1	6084
40412 7590 11/16/2007 IBM CORPORATION- AUSTIN (JVL) C/O VAN LEEUWEN & VAN LEEUWEN PO BOX 90609 AUSTIN, TX 78709-0609			EXAMINER RAMPURIA, SATISH	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/777,908

Applicant(s)

LANGDALE ET AL.

Examiner

Satish S. Rampuria

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 01/02/2007, 2/12/2004
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the application filed on 02/12/2004.
2. Claims 1-20 are pending.

Information Disclosure Statement

3. An initialed and dated copy of Applicant's IDS form 1449 filed on 01/02/2007 and 02/12/2004 is attached to the instant Office action.

Oath/Declaration

4. The Office acknowledges receipt of a properly signed oath/declaration filed 02/12/2004.

Drawings

5. The drawings were received on 02/12/2004. These drawings are acceptable by the examiner.

Specification

6. The disclosure is objected to because of the following informalities:
Appropriate correction is required.
7. The use of the trademark/service mark "Java", "JVM", "Unix", "Linux" has been noted in this application (i.e., page 1, 2; Applicant are respectfully requested to thoroughly check the application for any trademark related issue). It should be appropriate or proper term (i.e., Java™) (see MPEP 608.01(v)) used, wherever it appears and be accompanied by the generic terminology (for details please visit

<http://www.sun.com/suntrademarks>, <http://www.unix.org/trademark.html>,
<http://www.linuxmark.org/attribution.php>). Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

8. Claim 15, 16, 17 objected to because of the following informalities: Claims 15, 16, 17 are dependent on claim 1. However, it appears to be a typo claims should have been dependent on claim 14. Appropriate correction is required.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 14-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 14-20 recite computer readable media, the term as described in the specification, page 29, lines 1-18 that "downloaded via the Internet or other computer network". Downloading via the Internet which includes transmission media (as interpreted by the Examiner) includes coaxial cables, copper wire and fiber optics, including the wires that comprise the bus. Transmission media can also take the form of

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carrier waves; i.e., electromagnetic waves that can be modulated, as in frequency, amplitude or phase, to transmit information signals. Additionally, transmission media can take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications. Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism per se, and as such are nonstatutory natural phenomena. *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 112-14 (1853). In contrast, a claimed computer-readable storage device/media encoded with a computer program is a computer element, which defines structural and functional interrelationships between the computer program and the rest of the computer, that permits the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in § 101.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 6, 13 and 20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6, 13 and 20 recites the limitation "a third time". There is insufficient antecedent basis for this limitation in the claim.

Clarification and/or correction are required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 1-3, 8-10, and 14-16 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,862,650 to Matthews et al. (hereinafter, Matthews).

Per claim 1:

Matthews discloses:

1. A computer implemented method of reclaiming memory occupied by Just-in-Time (JIT) compiled programs, said method comprising:

tracking a JIT compiled program, the tracking recording tracking data that includes a method name corresponding to the JIT compiled program and an address range that corresponds to the JIT compiled program (col. 6, lines 42-44 "Java programming code is compiled by either JVM 310 or JIT 308, the code is stored in "pages" in a heap");

discarding one or more memory pages included in the address range (col. 7, lines 54-55

"automatically discard the pages out of the heap");

branching to an address included in one of the discarded pages (col. 9, lines 54-56

"JVM... call a registration API in operating system...for invalid access exception (e.g. page fault exception)", the branching resulting in a page fault (col. 9, lines " ");

retrieving the method name corresponding to the address that resulted in the page fault (col. 9, lines 53-54 "JVM 310 registers for a page fault exception to operating system 302"); and

executing a method corresponding to the retrieved method name (col. 9 lines 55-57 "JVM 310 would call a registration API in operating system 302 for invalid access exception (e.g. page fault exception)").

Per claim 2:

The rejection of claim 1 is incorporated and further, Matthews discloses:

2. The method of claim 1 wherein executing the method further comprises:

recompiling the method using a JIT compiler, the recompiling resulting in a replacement JIT compiled program stored at the recorded address range, wherein the executed method is the replacement JIT compiled program (col. 10, lines 7-8 "when Java application 314 reaccesses a memory location associated with compiled code and that compiled code has been cleared from").

Per claim 3:

The rejection of claim 1 is incorporated and further, Matthews discloses:

3. The method of claim 1 wherein executing the method further comprises:

removing the method name and the corresponding address range from the tracking data (col. 10, lines 2-5 "heap 312 becomes full or should operating system 302 require additional memory space for execution of application 314, code is cleared from heap 312"); retrieving an interpretable form of the method (col. 3, lines 4-5 "software program is an interpreted language program"); and interpreting code included in the interpretable form of the method (col. 3, lines 15-17 "method includes the steps of receiving a software program written in an interpreted programming language").

Claims 8-10 are the system claim corresponding to method claims 1-3 respectively, and rejected under the same rational set forth in connection with the rejection of claims 1-3 respectively, above, as noted above.

Claims 14-16 are the computer program product claim corresponding to method claims 1-3 respectively, and rejected under the same rational set forth in connection with the rejection of claims 1-3 respectively, above, as noted above.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 4-7, 11-13, and 17-20 rejected under 35 U.S.C. 103(a) as being unpatentable Matthews in view of US Publication No. 2004/0167945 to Garthwaite (hereinafter, Garthwaite).

Per claim 4:

The rejection of claim 1 is incorporated and further, Matthews discloses:

4. The method of claim 1 further comprising:

memory mapping the JIT compiled program from a nonvolatile storage location to the address range using a special filesystem (col. 7, lines 1-5 "...memory from a portion of JVM 310 heap 312) to an external memory.... external memory may be a disk that stores a plurality of paging files");

prior to the discarding, receiving, at the special filesystem, an instruction to write (to nonvolatile storage) the one or more memory pages that are about to be discarded (col. 7, lines 1-5 "operating system 302 will swap memory from a portion of JVM 310 heap 312) to an external memory (not illustrated herein). The external memory may be a disk that stores a plurality of paging files"); and

Matthews does not explicitly discloses returning a response indicating successful completion of the instruction without writing any of the pages to the nonvolatile storage location.

However, Garthwaite discloses in an analogous computer system returning a response indicating successful completion of the instruction without writing any of the pages to the nonvolatile storage location (paragraph [0137] "Block 216 represents branching on whether the evacuation was successful. If it was not, a forwarding pointer will have

been left in the already-evacuated object's previous location, and, as block 218 indicates, the collector will simply update the reference without duplicating the evacuation of the object to which it refers").

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of returning a response indicating successful completion of the instruction without writing any of the pages to the nonvolatile storage location as taught by Garthwaite into the method of managing memory in a data processing as taught by Matthews. The modification would be obvious because of one of ordinary skill in the art would be motivated to returning a response indicating successful completion of the instruction without writing any of the pages to the nonvolatile storage location to provide dynamically allocation of memory use as suggested by Garthwaite (paragraph [0013]).

Per claim 5:

The rejection of claim 4 is incorporated and further, Matthews discloses:

5. The method of claim 4 further comprising:

registering an error handler to handle a specific invalid operation code (opcode) (col. 9, lines 48-49 "JVM... registers for an exception during an initialization process") prior to discarding any of the memory pages (col. 7, lines 54-55 "automatically discard the pages out of the heap");

in response to the page fault, calling the special filesystem to load the one or more discarded memory pages from the nonvolatile storage location (col. 7, lines 1-5

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"...memory from a portion of JVM 310 heap 312) to an external memory.... external memory may be a disk that stores a plurality of paging files";

writing, by the special filesystem, one or more occurrences of the invalid opcode to one or more of the memory pages that were previously discarded (col. 7, lines 1-5 "operating system 302 will swap memory from a portion of JVM 310 heap 312) to an external memory (not illustrated herein). The external memory may be a disk that stores a plurality of paging files"); and

re-branching to the address that caused the page fault, the re-branching resulting in an invalid opcode exception (col. 9, lines 53-56 "JVM 310 registers for a page fault exception to operating system 302. JVM 310 would call a registration API in operating system 302 for invalid access exception (e.g. page fault exception).").

Per claim 6:

The rejection of claim 5 is incorporated and further, Matthews discloses:

6. The method of claim 5 further comprising:

executing the error handler in response to encountering the invalid opcode (col. 9, lines 56-58 "Depending on an exception manager in the operating system, the registration is performed on a per thread basis or a per process basis"), wherein the executing includes: retrieving the address range from the tracking data that includes the address that caused the page fault (col. 2, lines 2-4 "Java application 314 is executing, class files are called by JVM 310. Each of class files is processed directly as byte-code instructions or converted to native instructions (using JIT compiler 308) and stored in heap");

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retrieving the method name from the tracking data, wherein the retrieved method name corresponds to the address range (col. 10, lines 8-10 "when Java application 314 reaccesses a memory location associated with compiled code and that compiled code has been cleared from heap"); and

re-compiling method code corresponding to the method name so that the re-compiled program is stored at the same address range as the original JIT compiled program (col. 10, lines 24-27 "The code may be translated into either byte-code instructions or passed to JIT compiler 308 where it is converted to native instructions, in accordance with specifications of Java application 314").

Per claim 6:

The rejection of claim 6 is incorporated and further, Matthews discloses:

7. The method of claim 6 further comprising:

branching a third time to the address that caused the page fault, the branching performed after the re-compiling (col. 9, lines 54-56 "JVM... call a registration API in operating system...for invalid access exception (e.g. page fault exception)"); and

executing the re-compiled method code (col. 10, lines 22-24 "a resume execution message is then transmitted to page manager 604 such that it continues executing properly").

Claims 11-13 are the system claim corresponding to method claims 4-7

respectively, and rejected under the same rationale set forth in connection with the rejection of claims 4-7 respectively, above, as noted above.

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Claims 17-20 are the system claim corresponding to method claims 4-7 respectively, and rejected under the same rationale set forth in connection with the rejection of claims 4-7 respectively, above, as noted above.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Satish S. Rampuria** whose telephone number is **(571) 272-3732**. The examiner can normally be reached on **8:30 am to 5:00 pm** Monday to Friday except every other Friday and Wednesday and federal holidays. Any inquiry of a general nature or relating to the status of this application should be directed to the **TC 2100 Group receptionist: 571-272-2100**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Wei Y. Zhen** can be reached on **(571) 272-3708**. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Satish S. Rampuria
Patent Examiner/Software Engineer
Art Unit 2191

**MARY STEELMAN
PRIMARY EXAMINER**

A handwritten signature in black ink, appearing to read "Mary Steelman", written in a cursive style.